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lecture). N. L. Prokhorov gave a report on the existing memory circuits of magnetic, logical elements from the viewpoint of continuity. A. L. Rozovskiy - "Contactless Code Pulse Remote Measuring System", N. V. Silayev "Contactless Program Computer for the Automatic Operation of a Line Casting Machine". V. S. Serzhers' report dealt with the possibility of constructing circuits for proportional amplifiers, differentiators, and integrators of commercial controllers with the help of semiconductor elements. V. B. Gogolevskiy reported on transients in electromagnetic mechanisms and on the vibration of contacts. The following lectures were delivered at the fifth section: L. P. Sysoyev solved the problem of judging the parameters and detecting the signals which are linearly dependent on random parameters. M. Yu. Gadzhiyev reported on the determination of an intelligence signal mixed with a noise in the case of an independent variation of the carrier frequencies. I. I. Paishev studied an apparatus of continuous and discrete mode of operation, which is used to expand a random function in a canonical series. E. L. Nappel'baum described an optimal operator used to determine an intelligence signal on the background of normal noise with random dispersion. A. I. Teyman spoke about problems connected with the

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Seventh Scientific and Technical Conference of Young Scientists of the Institute of Automation and Telemechanics of the AS USSR

S/103/60/021/009/013/013
B012/B063

overshooting of random functions. Ye. S. Kochetkov explained the construction of theoretically and practically optimal, linear integral estimates of the expected value of the correlation function of steady random processes. T. I. Tovstukha's lecture dealt with the effect of random noise upon the operation of extremal control systems of the step- and gradient-types. V. M. Baykovskiy spoke about the determination of the transmissivity of a channel with discrete difference modulation in the absence of noise. V. M. Pomazan gave a report on the theoretical and experimental study of time systems in remote measurement with different cycles and different kinds of indication. The following lectures were held at the sixth section: V. D. Kazakov - "The Form of Minimum Symmetric Boolean Functions With Any Number of Variables". V. P. Didenko explained a digital method of minimizing Boolean functions in consideration of the unused state. V. V. Vorzheva gave a survey of investigations of circuits with real contacts. T. M. Aleksandridi spoke about the synthesis of switching schemes on the basis of two logical operations - the Scheffer stroke and its dual function. L. A. Gusev reported on "The Minimization of the Construction of Finite Automatic Machines (konechnyy avtomat)".

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O. P. Kuznetsov described logical networks with unequal delay times of the various elements. V. D. Kazakov and V. V. Naumchenko spoke about "The Realization of Boolean Functions With n Variables on Contactless Logical Switches by Means of the Method of Supplement to a Definition", A. D. Talantsev reported on "The Application of Logic-algebraical Transient Operators in the Analysis and Synthesis of Finite Automatic Machines (konechnyy avtomat) of a Special Type". The following lectures were held at the seventh section: O. I. Khasayev - "The Operation of an Asynchronous Motor of a Frequency Transformer With Semiconductor Triodes". V. M. Kolesnikov - "Investigation of Thyratron Pulse Drive With a Step-by-step Motor". V. D. Vershinin - "Application of the Principle of Invariance for the Stabilization of the Speed of Direct-current Motors". O. A. Kossov - "Direct-current Drive With a Semiconductor Pulse Rectifier". Chzhao Chzhou-lun' - "Optimal Control of Flying Drum Scissors With Eccentrics". A. R. Dzhelyalov - "Induction Motor With Longitudinal and Transverse Excitation as an Object of Automatic Control".

Card 9/9

32254

9,7200

S/103/61/022/012/011/016
D201/D305

AUTHOR: Gul'ko, F. B.

TITLE: A wide-band thyrite multiplier-divider

PERIODICAL: Avtomatika i telemekhanika, v. 22, no. 12, 1961, 1649-1655

TEXT: The author describes a thyrite multiplying device with a pass-band larger by one order of magnitude as compared with the existing types of multipliers. The increase in pass-band was achieved owing to the compensation of the parasitic component of thyrite admittance and by replacing the operation of obtaining the moduli of voltages by that of currents. The parasitic component of thyrite impedance was determined first in order to obtain an equivalent thyrite circuit. The impedance was measured for thyrite resistors type НПС-50-70(NPS-50-07) within 1 to 20 kc/s, using the differential transformer arrangement as shown in Fig. 1. a.c. voltage at the thyrite $U_{\sim}$ about 0.5 V, bias $U_{=}$ = 0.50 V. The circuit was balanced at the fundamental frequency using a CRO type Э0-7(EO-7)

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as a null indicator. The differential toroidal ferrite transformer (ferrite type 2000) was as follows: Winding w_1 - 20 turns, w_2 and w_3 - 200 turns. The equivalent circuit of a thyrite was then taken to consist of a conductance Y_T, corresponding to di/du at d.c., and connected in parallel resistive γ_r and reactive γ_x components of parasitic admittance. Analysis of graphs of the parasitic admittance against frequency shows that the equivalent circuit of thyrite may be actually represented by its resistive component R_T at d.c. shunted by a capacitance C_∞ and by a certain number of R_kC_k series networks having various time constants. The capacitance C_∞ and resistances R_k depend little on voltage and at least some of capacities C_k are non-linear, the non-linearity being small up to voltages of appr. 10 V. Taking only R_1C_1, the thyrite parasitic admittance may be compensated by a circuit as shown in Fig. 5b. The

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experiment showed that by proper adjustment of C_{∞}, C_1 and R_1 in the compensating circuit the resultant volt-ampere characteristic of the thyrite is practically identical to its static characteristic, at frequencies up to 5 kc/s; without compensation it begins to differ from it already below 1 kc/s. The extended frequency range multiplier-divider is thus based on thyrites compensated as shown in Fig. 5b. Two other conditions have to be satisfied: One is that opposite sign voltage sources are required and that the voltage applied to the thyrite should not posses a wider frequency spectrum than the signal being squared. The multplier circuit is based on the well-known relationship $Z = \frac{1}{400}\left[(X + Y)^2 - (X - Y)^2\right] = \frac{1}{100} XY$. The adjustment of the squarers is made according to the method of A. A. Maslov (Ref. 3: Avtomatika i telemekhanika, v. 18, no. 4, 1957). The basic circuit diagram of multiplier-divider is also shown. The thyrite current moduli are determined by two pairs of switches using point-contact silicon diodes $D_1 - D_8$, one pair for positive and one pair for negative current modulus. The thy-

Card 3/6

A wide-band thyrite ...

rites used are the NSP-50-0,7. The operational amplifiers used are three-channel amplifiers ГУ-10(TU-10). The static error of the device is ± 1% of 100 V max. The dynamic error begins to increase noticeably at frequencies of about 5 kc/s. The d.c. component of the output voltage has been found to be substantially constant for sinusoidal input voltages. There are 9 figures and 5 references: 4 Soviet-bloc and 1 non-Soviet-bloc. The reference to the English-language publication reads as follows: L. D. Kovach and V. Comley, An Analog Multiplier using thyrite. IRE Transaction - Electronic computers, June 1954.

SUBMITTED: April 4, 1961

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GUL'KO, F. B.

55

PHASE I BOOK EXPLOITATION SOV/6012

Akademiya nauk SSSR. Institut avtomatiki i telemekhaniki.

Avtomaticheskoye regulirovaniye i upravleniye (Automatic Regulation and Control) Moscow, Izd-vo AN SSSR, 1962. 526 p. Errata slip inserted. 9000 copies printed.

Resp. Ed.: Ya. Z. Tsypkin, Professor, Doctor of Technical Sciences; Ed. of Publishing House: Ye. M. Grigor'yev; Tech. Ed.: I. M. Dorokhina.

PURPOSE: This book is intended for scientific research workers and engineers concerned with automation.

COVERAGE: The book is a collection of articles consisting of papers delivered at the 7th Conference of Junior Scientists of the Institute of Automation and Telemechanics, Academy of Sciences USSR, held in March 1960. A wide range of scientific and technical questions relating to automatic regulation and control is covered.

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The articles are organized in seven sections, including automatic control systems, automatic process control, computing and decision-making devices, automation components and devices, statistical methods in automation, theory of relay circuits and finite automatic systems, and automated electric drives. No personalities are mentioned. References are given at the end of each article.

TABLE OF CONTENTS:

PART III. COMPUTING AND DECISION-MAKING DEVICES

L 17768-63
Pl-4/Po-4/Pq-4 GG/BC EWT(d)/FCC(w)/BDS/T-2 AFFTC/ASD/ESD-3/APGC/IJP(C) Pg-4/Pk-4/

ACCESSION NR: AT3001885 S/2906/62/000/000/0199/0204

AUTHOR: Gul'ko, F. B.

82

TITLE: Problems of the application of analog computers in optimal-control systems

SOURCE: Kombinirovannyye vychislitel'nyye mashiny; trudy II Vsesoyuznoy konferentsii-seminara po teorii i metodam matematicheskogo modelirovaniya. Moscow, Izd-vo AN SSSR, 1962, 199-204

TOPIC TAGS: computer, control, optimal, analog, repeat-solution, predictive, prognostic, optimization, optimizing, memory, chemical process, flight, landing, touchdown, aircraft, approach, low-approach

ABSTRACT: This theoretical paper investigates analog computers (AC) with repeat solutions operating at an accelerated (faster-than-real) time scale. These AC's constitute a model of an object or of an entire system. In search systems they do not solve the problem of the determination of a future state of the object, but calculate a plurality of its states under various assumptions regarding the control action. The utilization of such search systems for the optimization of transient processes, apparently, is difficult, even though it is possible in principle.

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ACCESSION NR: AT3001885

To the author's knowledge there is no extant literature on the subject. Computing devices to be employed for the optimization of transient processes require computers that can determine a multiplicity of future optimal states of an object under various assumptions regarding the parameters of these states and, hence, different corresponding boundary conditions. Such computing devices must, of necessity, operate at an accelerated time rate and with repeat solution, regardless of the method whereby the basic model is to be solved. Optimal prediction may lead to qualitatively new control systems; on the other hand, the development of optimal control systems with the use of predicting equipment entails novel requirements for new AC's operating in a periodic regime. Two methods are discussed separately: (1) A method in which a variational problem that determines a desired optimal process is found; (2) a method of optimal prediction based on the use of some structural property of the optimal process, for example, the n-interval theorem. In this instance, the AC's calculate a family of trajectories of a specified structure that pass through various points in the space of the states of the system, and comprises also a suitable equipment to select that trajectory which passes through the given point. Two examples are developed, one with reference to the paper by J. E. Coales, et al. (An on-off servo mechanism with predicted change-over. IRE, Proc., v.103, no.10, 1956, 449-462), and a paper by H. Chestnut et al. (Predictive-control system application. Applications & Industry, no. 5, 1961, 128-134).

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ACCESSION NR: AT3001885

Important applications of predictive equipments and optimally-fast automatic control systems: Control of chemical processes, guidance and control of aircraft during landing maneuvers, etc. Fine tuning of such devices is briefly summarized and illustrated. The basic elements of predictive equipment comprise: (1) An analog of the relay element; (2) operational amplifier and electronic switches; (3) memory; (4) the switch-control block. The relay-element analog is usually a trigger or an amplifier with a limiter in the feedback or in the output. Orig. art. has 2 figures and 3 numbered equations.

ASSOCIATION: none

SUBMITTED: 00 DATE ACQ: 11Apr63 ENCL: 00

SUB CODE: CP, MM, CG NO REF SOV: 000 OTHER: 004

Card 3/3

GUL'KO, F. B.; KOGAN, B. Ya.

"Method of Optimum Control with Prediction."

Paper to be presented at the IFAC Congress held in Basel, Switzerland, 27 Aug to 4 Sep 63

S/280/63/000/001/009/016
E140/E435

AUTHOR: Gul'ko, F.B., (Moscow)

TITLE: On a certain property of the structure of optimal processes

PERIODICAL: Akademiya nauk SSSR. Izvestiya. Otdeleniye tekhnicheskikh nauk. Tekhnicheskaya kibernetika. no.1, 1963, 91-97

TEXT: A theoretical basis is advanced for the method of optimal control with prediction for processes consisting of the series connection of first order networks (linear or with monotonic nonlinearities). It is shown that for optimal control of such processes it is necessary to realize successively optimal control of a reduced number of networks of the initial process. The results are extended to the case of constrained phase coordinates. The essential feature of all known methods of solving this problem is that a family of possible future optimal trajectories of the system in phase space is computed in less than real time, each trajectory emerging from the present state of the system, and that optimal trajectory is adopted which passes through the next desired point in phase space. It is shown by the author that for

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On a certain property ...

systems having the characteristics described above, the property of successive optimality exists, i.e. the property that for an optimal trajectory $x(t)$, $0 \leqslant t \leqslant T$ there exists a τ such that in the intervals $(0,\tau)$ and (τ,T), $x(t)$ coincides with the trajectories of an optimal system of the order less by unity than the order of the initial system. There are 2 figures.

SUBMITTED: August 28, 1962

L 2.236-65 EWT(d)/EPF(n)-2/EWP(l) Po-4/Pq-4/Pg-4/Pu-4/Pk-4/P1-4 IJP(c)
WW/GS/EC

ACCESSION NR: AT5003902 S/0000/64/000/000/0022/0031

AUTHORS: Gul'ko, F. B.; Kogan, B. Ya. (Doctor of technical sciences); Lerner, A. Ya.

TITLE: Method of optimal control with prediction

SOURCE: Vsesoyuznaya konferentsiya-seminar po teorii i metodam matematicheskogo modelirovaniya. 3d, 1962. Vychislitel'naya tekhnika v upravlenii (Computer technology in control engineering); sbornik trudov konferentsii, Moscow, Izd-vo Nauka, 1964, 22-31

TOPIC TAGS: optimization control system, optimal control, predictive control

ABSTRACT: After pointing out briefly the advantages offered by the use of control systems with predicted change-over and the difficulties involved in their practical realization, especially the difficulty of applying prediction methods to objects of order higher than

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L 27236-65

ACCESSION NR: AT5003902

the second, the authors point out a possibility of eliminating these difficulties in single-loop objects consisting of first-order elements, by making use of the features of the optimal processes in such systems. This permits the realization of an optimal control system for an n-th order system by developing an optimal regulator for an object of order n - 1 in conjunction with a prediction unit. By applying this principle successively to objects of order (n - 1), (n - 2), etc., down to second-order inclusive, it is possible to construct for an object of n-th order an optimal system whose control section consists of an aggregate of prediction units. The theory is illustrated for an optimal control system with prediction with respect to a single coordinate, and the optimal control of a fourth-order object is used as an illustrative example. It is shown also that since the prediction unit is a high-speed computer that repeats the solutions at high frequency but with relatively low accuracy requirements, the use of analog prediction units is most advantageous, and a predictor of this type with low drift is described.

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L 27236-65

ACCESSION NR: AT5003902

Orig. art. has: 6 figures and 2 formulas.

ASSOCIATION: None

SUBMITTED: 17Aug64 ENCL: 00 SUB CODE: IE, DP

NR REF SOV: 006 OTHER: 002

Card 3/3

L 18857-65 ASD(a)-5/AEDC(a)/AFETR/AFMDC/RAEM(d)/ESD(dp)
ACCESSION NR: AP4041465 S/0103/64/025/006/0896/0908

AUTHOR: Gul'ko, F. B.; Kogan, B. Ya. (Doctor of technical sciences); Lerner, A. Ya. (Doctor of technical sciences); Mikhaylov, N. N.; Novosel'tseva, Zh. A.

TITLE: Prediction method with high-speed analog computers and its application

SOURCE: Avtomatika i telemekhanika, v. 25, no. 6, 1964, 896-908

TOPIC TAGS: automatic control, predictive automatic control, predictor, analog computer predictor

ABSTRACT: A method of optimum or near-optimum predictive control and the principles of analog predictors are considered. A time-optimized third-order system for controlling a 3-link plant is examined as an example illustrating the method of truncating the system by one order and using an analog-type predictor. The predictive method may be used for controlling plants of any order describable

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by this form of differential equation:

$$\dot{x}_1 = f_1(x_1, u)$$
$$\dots\dots\dots$$
$$\dot{x}_k = f_k(x_k, x_{k-1}),$$
$$\dots\dots\dots$$
$$\dot{x}_n = f_n(x_n, x_{n-1}),$$

where u = u(t) is the controlling action; $|u(t)| \leqslant 1$, all functions f_k $(k = 2, 3, \dots, n)$ are assumed to be continuous and continuously differentiable with respect to x_k, x_{k-1} and f, continuous with respect to u. The optimality of the trajectories computed in any (but the first) predictor is ensured by the presence inside any predictor of other predictors computing, in an accelerating manner, the trajectories in a decreasing number of links. An approximate simulator of the plant is recommended for the predictor, which is intended for repeated solving of a set of differential equations. A laboratory model of such a predictor with six computing amplifiers, built by V. V. Gurov, permits an equation-solution

L 18857-65

ACCESSION NR: AP4041465

C

frequency up to 200 per sec. Orig. art. has: 12 figures and 7 formulas.

ASSOCIATION: Institut avtomatiki i telemekhaniki AN SSSR (Institute of Automation and Telemechanics, AN SSSR)

SUBMITTED: 00 ENCL: 00

SUB CODE: DP, IE NO REF SOV: 007 OTHER: 003

Card 3/3

L 43710-65 EWT(d)/EWT(l)/EWP(k)/EWP(h)/EWP(1) BC

ACC NR: AP6023668 SOURCE CODE: UR/0103/66/000/004/0122/0141

AUTHOR: Gul'ko, F. B. (Moscow); Novosel'tseva, Zh. A. (Moscow)

ORG: none

TITLE: Solution of nonstationary problems of filtration and prediction by simulation methods

SOURCE: Avtomatika i telemekhanika, no. 4, 1966, 122-141

TOPIC TAGS: optimal automatic control, random function, linear automatic control system, computer simulation, filter, mathematic prediction

ABSTRACT: A nonstationary problem of optimal linear filtration and prediction is considered for a class of additive noise with finite dispersion. Differential filter equations are derived, permitting the use of analog computers in the solution of the problem. Examples and simulation results are given. Representation of optimal filtration and prediction problems in the form of a differential equation with respect to the useful signal is found to be a very convenient technique for the synthesis of optimal filters and their simulation. For this reason the results obtained may in some cases prove to be more useful than other methods which are of an essentially calculational nature. The formulas obtained provide a complete solution to the synthesis problem, by defining the structure of the filter (predictor) and the values of all its

Card 1/2 UDC: 621.391.172.001.57

L 43710-66

ACC NR: AP6023668 O

parameters. The most significant technical difficulties are encountered in the handling of the variable factors, the complexity of the determination of which increases disproportionately as the exponent of the differential filter equation increases. However, this problem can be easily circumvented through the use of memory devices since the law governing the change of the factors is determined by a priori information alone and is susceptible to prior computation. The results constitute an extension of the well known results of R. E. Kalman and R. S. Bussey (Novyye resul'taty v lineynoy fil'tratsii i teorii predskazaniya. Trudy Amerikanskogo obshchestva inzhenerov-mekhanikov, seriya D, "Tekhnicheskaya mekhanika" (russk. per.), t. 83, No. 1, Izd-vo inostr. lit., 1961) to a case in which the additive noise in the observed signal is of finite dispersion. Here, by virtue of the formal analogy between the basic equations in both works the study of stability and convergence aspects in the problem discussed can be carried out with the methods of Kalman and Bussey. This article deals only with the particular case of additive noise with finite dispersion--specifically, with a situation in which this interference can be reduced to white noise by means of a linear differential operator (operator without memory). In this instance, the exponent of the differential equation which describes the filter is not greater than that of the object under observation. Orig. art. has: 5 figures and 40 formulas.

SUB CODE: 09,14/ SUBM DATE: 10Jul65/ ORIG REF: 002/ OTH REF: 002

Card 2/2

ACC NR: AT6029240 SOURCE CODE: UR/0000/66/000/000/0270/027?

AUTHOR: Gul'ko, F. B.; Smirnov, N. A.

ORG: none

TITLE: Use of prediction methods for controlling nuclear reactor start-up

SOURCE: Vsesoyuznaya konferentsiya-seminar po teorii i metodam matematicheskogo modelirovaniya. 4th, Kiev, 1964. Vychislitel'naya tekhnika v upravlenii (Computer technology in control engineering); trudy konferentsii. Moscow, Izd-vo Nauka, 1966, 270-279

TOPIC TAGS: nuclear reactor operation, nuclear reactor, nuclear reactor accident, computer simulation, control simulator

ABSTRACT: The essence of prediction methods is that the manipulated variable (or control input) is not formed on the basis of actual values of the phase coordinates of the controlled object but on the basis of their predicted values. The predicted values are calculated by a prediction device which is a high-speed electron simulator of the controlled plant with an iterative solution operating in conjunction with a transponder. The investigation covered the start-up processes of a reactor for physical and technological research and of a thermal reactor, as well as the equipment for electronic simulation. For both reactors the problem was reduced to that of producing the desired neutron rate levels or the desired temperature. Where these levels are about to be ex-

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ACC NR: AT6029240

ceeded during the start-up, an emergency shut-down takes place. In the simplified model of the reactor for physical and technological research, the investigations were limited to one equivalent group of retarded neutrons, without consideration of the effect of temperature upon reactivity. Upon introducing several restrictions, a system of nonlinear differential equations of the start-up process was constructed. Upon neglecting the small terms, the system was solved, and a functional transform for the change-over line was developed. For the thermal reactor where the reactivity depends on the temperature, an analogous method was adopted. Block diagrams for both types of reactors were developed. The electronic simulation was performed on a EMU-10 device which is equipped with computing elements operating simultaneously in different time scales, which is a necessary condition for prediction. The start of the reactor for physical and technological research was simulated for two variants: with a functional generator controlling the system, and with a prediction device. The time scale of the prediction device exceeded the time scale of the reactor model by a factor of 50. Orig. art. has: 3 figures, 14 formulas.

SUB CODE: 18/ SUBM DATE: 12Feb66/ ORIG REF: 006/ OTH REF: 001

Card 2/2

ACC NR: AP6034048 SOURCE CODE: UR/0103/66/000/010/0153/0168

AUTHOR: Gul'ko, F. B. (Moscow); Novosel'tseva, Zh. A. (Moscow)

ORG: none

TITLE: Solving the nonstationary problems of filtration and prediction with arbitrary noise by simulation methods

SOURCE: Avtomatika i telemekhanika, no. 10, 1966, 153-168

TOPIC TAGS: signal noise separation, electric filter, computer simulation

ABSTRACT: This is a continuation of the authors' earlier work (Avtom. i telemekh., no. 4, 1966); a more general form of noise, viz., arbitrary additive noise, is considered. Differential equations describing the filter are set up, which permits using analog computers for solving the problem. From known values of signal $x(\tau)$ during (t_0, t), an estimator $\hat{x}(t_3 | t)^*$ of the desirable

 UDC: 62-501.22

ACC NR: AP6034048

signal $x(t_1)$ at the moment $t_1 > t$ is sought; the estimator must satisfy the condition of mean-square error minimum for each component of vector $x(t_1)$ for any observation interval (t_0, t). This estimator is sought as a solution of the above differential equations for the time interval (t_0, t). The relation between the noise type and the filter structure is investigated, as well as the convergence of the estimator. An example of motion of a material point illustrates the solution of the above filtration problem. Orig. art. has: 4 figures and 70 formulas.

SUB CODE: 09 / SUBM DATE: 25Mar66 / ORIG REF: 002 / OTH REF: 002

Card 2/2

ACC NR: AR6029300 SOURCE CODE: UR/0271/66/000/006/B046/B046

AUTHOR: Yesipenko, V. D.; Savis'ko, P. A.; Gul'ko, I. F.; Zhelnitskiy, A. I.

TITLE: Some results of experiments with electroluminescent data display systems

SOURCE: Ref. zh. Avtomatika, telemekhanika i vychislitel'naya tekhnika, Abs. 6B348

REF SOURCE: Sb. Fiz.-tekhnol. vopr. kibernet. Seminar. Vyp. 1. Kiyev, 1965, 55-75

TOPIC TAGS: electric device, data readout, real time data display

ABSTRACT: The merits of this type of data display are noted. Parametrons are used in the control circuit of the data display unit. On the basis of the experimental results obtained the following conclusions are made: 1) such a display unit can operate successfully at an excitation frequency up to 10 kc, 2) an increase in the frequency makes it possible to reduce the electric field strength in order to obtain the same brightness, 3) with an increase in the frequency the brightness sensitivity to supply voltage also increases, 4) a sharp decrease in brightness in the initial periods of operation requires a preliminary conditioning of the display units, and 5) under conditions of constant brightness the operation of the display units is considered optimum. [Translation of abstract] 10 illustrations and bibliography of 9 titles. A. F.

SUB CODE: 09

Card 1/1 UDC: 681.142.623

GUL'KO, I.S. [Hul'ko, I.S.]

Trace element concentration in the organism of patients with stomach cancer. Vestsi AN BSSR. Ser.biial.nav. no.2:117-126 '60. (MIRA 13:7)

(STOMACH--CANCER) (MINERALS IN THE BODY)

GUL'KO, I. S. Cand Med Sci -- "Content of zinc, copper, manganese, cadmium, and nickel in cancer patients." Vil'nyus, 1960 (Min of Higher and Secondary Specialized Education USSR. Vil'nyus State Univ im V. Kapsukas). (KL, 1-61, 206)

GUL'KO, I.S., aspirant

Some minor elements in cancer patients. Zdrav. Belor. 6 no.4:20-23 Ap '60. (MIRA 14:5)

1. Iz kafedry gospital'noy terapii (zaveduyushchiy - professor G.Kh. Dovgyallo) Minskogo meditsinskogo instituta.
(CANCER) (MINERALS IN THE BODY)

GUL'KO, I. S.

Zinc, copper, manganese, cadmium, cobalt and nickel content in the blood, organs and tumors in cancer patients. Vop. onk. 7 no.9:46-51 '61. (MIRA 14:12)

1. Iz kafedry gospital'noy terapii (zav. - prof. G. Kh. Dovgyallo) Minskogo meditsinskogo instituta.

(CANCER) (TRACE ELEMENTS IN THE BODY)

DOVGYALLO, G. Kh.; GUL'KO, I.S.

Use of nicotinic acid in atherosclerosis. Terap. arkh. 35 no.9: 27-29 S'63 (MIRA 17:4)

1. Iz kafedry gospital'noy terapii (zav. - prof. G.Kh. Dovgyallo) Minskogo meditsinskogo instituta.

KOTOV, A.F., inzh.; GUL'KO, L.V., inzh.; BIROV, Yu.A., inzh.

Automatically controlled main electric drive of a multibucket excavator. Nauch. zap. Ukrniiproekta no.2:152-162 '60. (MIRA 15:1)
(Excavating machinery--Electric driving) (Automatic control)

GUL'KO, L. Ye.

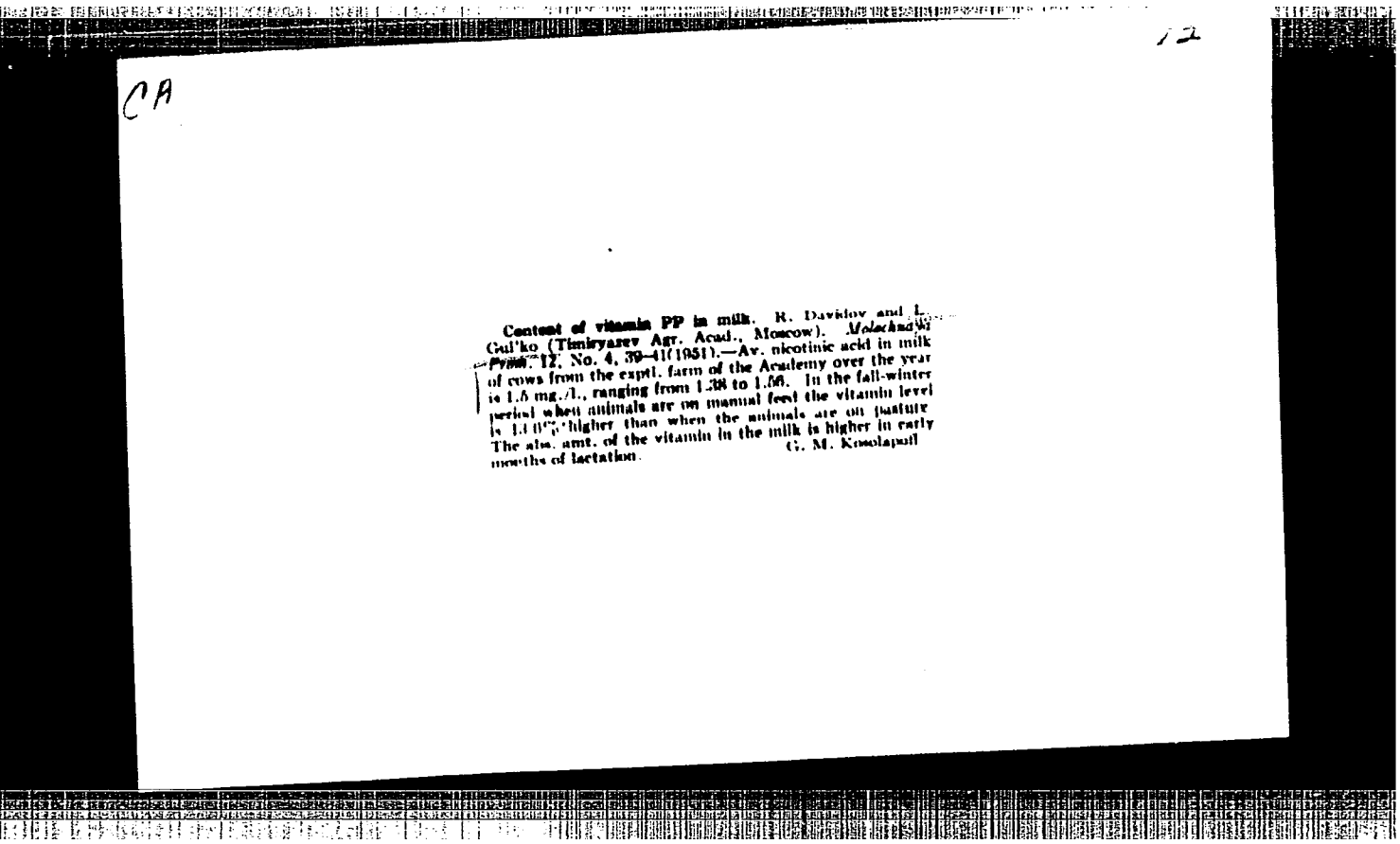
20926 Davidov, R. B. i Gul'ko, L. Ye. Soderzhaniye vitamina "C" v sutochnam udoye moloka. Sbornik dokladov Pervoy Vsesoyuz. Konf-tsii po moloch. delu. M., 1949, s. 213-21

SO: LETOPIS ZHURNAL'NYKH STATEY - Vol. 28, Moskva, 1949

CA

12

Vitamins B_1 and B_2 in milk. R. Davidov and L. Gul'ko (Timiryazev Agr. Acad., Moscow). *Molochnaya Prom.* 11, No. 6, 19-21(1950). The occurrence of the vitamins in milk is reviewed. In an exptl. herd the B_1 level ranges from 329 γ/l. in winter to 516 in the fall; spring and summer values are 410–490. Riboflavin varied between 800 and 1170 γ/l. No significant variations during lactation were observed. G. M. Kosolapoff



CA

12

Content of vitamin PP in milk. R. Davidov and L. Gul'ko (Timiryazev Agr. Acad., Moscow). *Molochnaya Prom.* 12, No. 4, 39–41(1951).—Av. nicotinic acid in milk of cows from the exptl. farm of the Academy over the year is 1.5 mg./l., ranging from 1.38 to 1.66. In the fall-winter period when animals are on manual feed the vitamin level is 1.10% higher than when the animals are on pasture. The abs. amt. of the vitamin in the milk is higher in early months of lactation. G. M. Kosolapoff

CA

12

Changes in the content of vitamins B_1, B_2, and PP in milk during production of cheese. R. Davidov and L. Gol'ko (Timiryazev Agr. Acad., Moscow). *Molochnaya Prom.* 12, No. 10, 28–30(1951).—Pasteurization has little affect on vitamin B_1 content; some increase takes place in formation of the curd. In cheese before ripening a considerable decline is noted, but after ripening the amt. is substantially replaced. Riboflavin on the other hand tends to decline during the aging of the cheese. Vitamin PP (nicotinic acid) declines by 50% during the fermentation stage and the process continues during the ripening until the final product contains but 20% of initial values. The milk "serum" from milk-sugar production is an excellent source of the B group of vitamins since that is the normal site of their accumulation during the fermentation process. G. M. K.

GUL'KO, L. E.

Chemical Abstracts
Vol. 48 No. 5
Mar. 10, 1954
Foods

Several factors influencing the content of vitamin C in milk. R. DaVidov and L. E. Gul'ko. *Izvest. Timiryazev. Sel'skokhoz. Akad.* No. 2(3), 179–92(1953); *Uspekhi Sovremennoi Biol.* 36, 457–64(1953).—The av. annual content of ascorbic acid in milk sampled at the Timiryazev Academy Dairy Farm and at the collective Borets varies from 13 to 16 mg./l. and fluctuates within the limits of 7-23/l. Market milk contains 6–7 mg./l. with fluctuations of 4-11/l. From the time of milking to that of sale to consumer the ascorbic acid content drops to one half. Evening milking gives the max. ascorbic acid, 30% more in the summer and 50% more in the winter than the morning milking. During the winter, milk contains 30–40% more ascorbic acid than during the summer, the min. amt. of the vitamin occurring during June–August. During the first 2–3 months of the lactation period the vitamin content is rising, then it drops up to the 8th month and then rises slightly. If the cows are not bred during the period this regularity does not hold. Milk in storage loses as much as 50% of its vitamin C content, depending on the temp. and period of storage. A prolonged period of pasteurization causes the loss of 20.4% and by the flash method only 11.1% vitamin C.

J. S. Joffe

DAVIDOV, R.B.; GUL'KO, L.Ye.

Certain factors affecting vitamin C content in milk. Usp. sovrem. biol. 35 no.3:457-464 May-June 1953. (CIML 25:1)

1. Moscow.

DAVIDOV, R.B., (Moscow); GUL'KO, L.Ye., (Moscow).

Certain factors affecting the vitamin C content in milk. Usp.sovr.biol. 35 no.5:457-464 My-Je '53. (MLRA 6:6)
(Vitamins) (Milk--Composition)

DAVIDOV,R.B.; GUL'KO,L.Ye.

Vitamin A,B, and B_2 content of milk. Vit.res. i ikh isp. no.2: 103-112 '54. (MLRA 8:10)

1. Timiryazevskaya sel'skokhozyaystvennaya akademiya.
(Milk--Analysis and examination) (Vitamins)

DAVIDOV, Ruben Bagdasarovich; GUL'KO, Liya Yefimovna; YERMAKOVA, Mariya Alekseyevna; BUKIN, V.N., professor, doktor biologicheskikh nauk, retsenzent; INIKHOV, G.S., professor, doktor khimicheskikh nauk, retsenzent; DEVYATNIN, V.A., kandidat khimicheskikh nauk, spetsredaktor; AKIMOVA, L.D., redaktor; CHEBYSHEVA, Ye.A., tekhnicheskiy redaktor

[Principal vitamins in milk and milk products] Osnovnye vitaminy v moloke i molochnykh produktakh. Moskva, Pishchepromizdat, 1956. 229 p. (MLRA 9:8)

(MILK) (VITAMINS)

DAVIDOV, R.B., doktor tekhnicheskikh nauk, professor; GUL'KO, L.Ye., kandidat sel'skokhozyaystvennykh nauk.

Factors influencing the amount of thiamine in milk. Izv. TSKhA no.2:179-186 '56. (MLRA 9:12)

(Thiamine) (Milk--Composition)

DAVIDOV, R., professor; GUL'KO, L., kandidt sel'skokhozyaystvennykh nauk.

Change in the number of vitamins in milk during its storage and pasteurization. Moloch.prom. 18 no.3:43-45 '57. (MLRA 10:4)
(Vitamins) (Milk)

L 8960-66

ACC NR: AP5026501 SOURCE CODE: UR/0286/65/000/019/0032/0032

35
B

AUTHORS: Gul'ko, L. V.; Semagina, E. P.

ORG: none

TITLE: Device for stabilizing the average value of a regulated periodic quantity. Class 21, No. 175104

SOURCE: Byulleten' izobreteniy i tovarnykh znakov, no. 19, 1965, 32

TOPIC TAGS: automatic regulation, voltage stabilization

ABSTRACT: This Author Certificate presents a device for stabilizing the average value of a regulated periodic quantity. The device contains a nonlinear unit with saturation and dynamic sections in the direct circuit and a ripple filter in the main linear feedback circuit (see Fig. 1). To increase the accuracy of stabilizing the regulated parameter, the main feedback circuit is spanned by two limiting units whose inputs are connected through attenuators determining the cutoff level to the output of the ripple filter.

UDC: 621.3.078

Card 1/2

L 8960-66

ACC NR: AP5026501

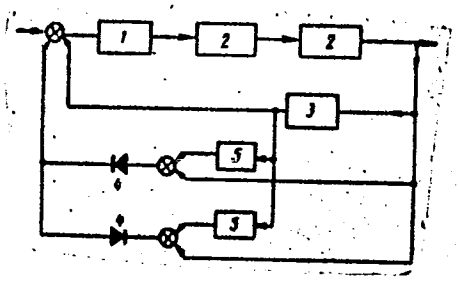


Fig. 1. 1 - Nonlinear unit; 2 - dynamic sections; 3 - ripple filter; 4 - limiting units; 5 - attenuators.

Orig. art. has: 1 diagram.

SUB CODE: 09/ SUBM DATE: 25Jun62

BVK

Card 2/2

DAVIDOV, R.B., prof.; GUL'KO, L.Ye., kand.med.nauk

Vitamin B_1 and B_2 content of human milk [with summary in English]. Pediatriia 37 no.3:32-36 Mr '59. (MIRA 12:4)

(MILK, HUMAN
vitamin B_1 & B_2 content (Rus))
(VITAMIN B_1
in human milk (Rus))
(VITAMIN B_2
same)

DAVIDOV, R.B., prof.; GUL'KO, L.Ye., kand.sel'skokhozyaystvennykh nauk

Milk as a source of riboflavin. Priroda 49 no.9:100-102 S '60. (MIRA 13:10)

1. Moskovskaya sel'skokhozyaystvennaya akademiya im. K.A.Timiryazeva.
(Milk) (Riboflavin)

DAVIDOV, R.B., doktor tekhn. nauk, prof.; FAYNGAR, B.I.; GUL'KO, L.Ye., kand. sel'skokhoz. nauk

Enrichment of whey with protein and vitamins. Izv. TSKHA no.5: 166-171 '63. (MIRA 17:7)

GUL'KO, K. K.

N/5
741
.09

Avtomaticheskiy Linii Stankov (Automatic Lines of Machines) Kiyev, Mashgiz, 1951.

133 P. Illus., Diagrs., Tables.

"Literatura": P. 133-(134)

DOBROVOL'SKAYA, Galina Viktorovna; GUL'KO,M.M., inzhener, redaktor; LEUTA,V.I., redaktor; RUDENSKIY,Ya.V., tekhnicheskiy redaktor

[Joint pins and jointings] Shtifty i shtiftovye soedineniia. Kiev, Gos.nauchno-tekhn.izd-vo mashinostroitel'noi lit-ry, 1955. 52 p. (MLRA 9:2)

(Machinery)

MISHYUK, Ol'ga Antonovna; BAYBAKOV,A.B., inzhener, redaktor; GUL'KO,M.M., retsenzent; ZALOGIN,N.S., redaktor; RUDNITSKIY,Ya.V., tekhnicheskiy redaktor

[Clamp couplings] Klemmovye soedineniia. Kiev, Gos.nauchno-tekhn. izd-vo mashinostroitel'noi lit-ry, 1955. 61 p. (MLRA 9:3)
(Couplings)

GREBEN', I.I., redaktor; GROZIN, B.D., redaktor; GUL'KO, M.M., redaktor; LYCH, N.M., redaktor; ORLIKOV, M.L., redaktor; FAYNERMAN, I.D., redaktor; KHAYMOVICH, Ye.M., redaktor; SERDYUK, V.K., inzhener, redaktor; MUDENSKIY, Ya.V., tekhnicheskiy redaktor.

[Automation in machine building] Avtomatizatsiia v mashinostroenii. Kiev, Gos.nauchno-tekhn. izd-vo mashinostroitel'noi lit-ry, 1955. 289 p. [Microfilm] (MLRA 9:1)

1. Vsesoyuznoye nauchno-tekhnicheskoye obshchestvo mashinostroitel'noy promyshlennosti. Kiyevskoye oblastnoye otdeleniye.
(Automation) (Mechanical engineering)

GUL'KO, M. M.

GOKUN, Vladimir Borisovich; LUR'YE, G.B., professor, doktor tekhnicheskikh nauk, retsenzent; KUKOBA, N.A., inzhener, redaktor; GUL'KO, M.M., inzhener, redaktor; SOROKA, M.S., redaktor izdatel'stva; RUDENSKIY, Ya.V., tekhnicheskiy redaktor

[Technological requisites for metal economy; reducing technological waste] Tekhnologicheskie predposylki ekonomii metalla; snizhenie tekhnologicheskikh otkhodov. Kiev, Gos.nauchno-tekhn.izd-vo mashinostroit.lit-ry, 1957. 181 p. (MLRA 10:8)
(Machinery industry)

Gul'Ko, M.M.

25(5) PHASE I BOOK EXPLOITATION SOV/[illegible]

Nauchno-tekhnicheskoye obshchestvo mashinostroitel'noy promyshlennosti. Kiyevskoye oblastnoye pravleniye

Mekhanizatsiya i avtomatizatsiya v mashinostroyenii; [sbornik statey] (Mechanization and Automation in Machine Manufacturing; Collection of Articles) Moscow, Mashgiz, 1959. 286 p. 8,000 copies printed.

Sponsoring Agency: Nauchno-tekhnicheskoye obshchestvo priborostroitel'noy promyshlennosti. Ukrainskoye respublikanskoye pravleniye.

Ed. of Publishing House: N.S. Soroka; Chief Ed. (Southern Division, Mashgiz): V.K. Serdyuk, Engineer; Editorial Board: M.M. Gul'ko, S.Sh. Zaslavskiy, A.Ya. Lopata, S.M. Lyuh, M.L. Orlikov, I.D. Faynerman, Ye.M. Khaymovich (Resp. Ed.), and S.I. Kharagorgiyev.

PURPOSE: This book is intended for engineering and technical personnel in machine and instrument-manufacturing plants and scientific research institutes.

COVERAGE: This book contains reports made by workers of machine and instrument-manufacturing plants, scientific research institutes, and educational institutions at the 2nd Kiyev Scientific and Technical Conference devoted to problems of mechanization and automation of production processes. The Conference was sponsored by the Kiyev Oblast Administration of the NTO Mashprom (Scientific and Technical Division of the Machine-Manufacturing Industry) and the Ukrainian Republic Administration of the NTO Priboroprom (Scientific and Technical Division of the Instrument Manufacturing Industry). These reports describe current problems encountered in automation of equipment, technological and control operations, and progressive work practices in manufacturing machines and instruments. I.I. Greben', S.M. Zaslavskiy, A.G. Tvakhnenko, V.L. Meseznikov, M.G. Mosenskis, and A.M. Farber participated in preparing the book. There are no references.

PHASE I BOOK EXPLOITATION SOV/4300

Gul'ko, Mikhail Mikhaylovich

Metally i materialy; spravochnyye tablitsy (Metals and Materials; Reference Tables) Moscow, Mashgiz, 1960. 241 p. (Series: Biblioteka konstruktora) 11,000 copies printed.

Sponsoring Agency: Vsesoyuznoye nauchno-tekhnicheskoye obshchestvo mashinostroitel'noy promyshlennosti. Kiyevskaya oblastnaya organizatsiya.

Reviewer: S.N. Filonenko, Candidate of Technical Sciences, Docent; Ed.: M.S. Soroka; Chief Ed. (Southern Division, Mashgiz): V.K. Serdyuk, Engineer.

PURPOSE: This book is intended for technicians and designers in machine building.

COVERAGE: The book is a reference manual containing tables with general engineering information, the mechanical properties, the chemical composition, and the grades of ferrous and nonferrous metals, their alloys, cast iron, powdered metals, and of chemical, heat-insulating, and refractory materials. The book also contains information on metals and materials necessary in the manufacture

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of instruments, machines, and equipment of machine-building plants. The information was obtained from GOST and OST standards (November 1, 1959), from standards of design bureaus and plants, and from literature in the field. No personalities are mentioned. There are 22 references, all Soviet.

TABLE OF CONTENTS:

L 43125-65 EWG(j)/EWP(e)/EPA(s)-2/EWT(m)/EPF(c)/EWP(i)/EPF(n)-2/EWG(m)/EPR/EPA(w)-2
EWP(t)/EPA(bb)-2/EWP(b) Pab-10/Pr-4/Ps-4/Pt-7/Pu-4 IJP(c) JD/WW/JG/AT/WH

ACCESSION NR: AR5008433 S/0081/65/000/003/M004/M004

SOURCE: Ref. zh. Khimiya, Abs. 3M30

AUTHOR: Repenko, K. N.; Getman, I. A.; Gul'ko, M.V.; Yefimenko, R. L.

TITLE: Hot pressing of boron, aluminum and titanium nitrides

CITED SOURCE: Sb. nauchn. tr. Ukr. n.-i. in-t ogneuporov, vyp. 7(54), 1963, 352-362

TOPIC TAGS: boron nitride, aluminum nitride, titanium nitride, pressed piece density, compacting environment, synthesis environment, nitride pressing

TRANSLATION: The authors determined the effects of temperature, time at that temperature and compacting pressure on the density of pieces hot pressed from nitrides of B, Al and Ti. The density of pieces from hexagonal boron nitride, which is characterized by extensive heat expansion anisotropy, is governed to a large extent by the conditions under which the nitride is synthesized. The densest pieces (porosity 6%) were obtained from a nitride synthesized at low temperatures. Pieces made from nitride synthesized at 1500C were characterized by the independence of their density from compacting temperature effects within the

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ACCESSION NR: AR5008433

range of 1500 - 2400C or effects of exposure periods up to 10 min. An increase in pressure from 150 to 200 kg/cm^2 produced some improvement in density. The density of pieces made from nitrides of Al and Ti depends on pressure, as well as on compacting temperature and exposure period. The density of pieces made from titanium nitride increases more sharply than the density of pieces made from aluminum nitride when the compacting temperature is raised. A recrystallization of Al and Ti nitride grains takes place during the pressing process. The process is facilitated by an increase in compacting temperature, pressure and exposure period. Recrystallization does not take place in boron nitride up to temperatures of 2400C and pressures of 200 kg/cm^2. Addition of $Ca_3(PO_4)_2$ has a beneficial effect on the improvement in density of pieces from boron nitride synthesized at 1500C. Nitrides of B, Al and Ti can be pressed in graphite molds since their interaction with the graphite is insignificant for total compacting times of 20 min. or less. Authors' summary

ENCL: 00

SUB CODE: MM, IE

Card 2/2 JO

GUL'KO, M.M., brigadir puti (st.Uzhgorod, L'vovskoy dorogi)

Improving the technology for welding rails in the track.
Put' put.khoz. no.9:24 S '59. (MIRA 12:12)
(Railroads--Rails--Welding)

Gul'Ko, N.V.

Genesis of cuspidine and the minerals of the humite group. L. I. Karyakin and N. V. Gul'ko. *Doklady Akad. Nauk S.S.S.R.*, 96, 581–4 (1954); *Chem. Abstr.*, 49 [1] 107e (1955). — Berezhnoi (*Dopovidi Akad. Nauk Ukr. R.S.R.*, 1954, No. 4) observed the formation of complex F silicates on the walls of a MgO crucible if a mixture of quartz and CaF_2 was heated in it. K. and G. identified, as newly formed products, cuspidine ($3CaO \cdot 2SiO_2 \cdot CaF_2$), norbergite ($Mg_3SiO_4 \cdot MgF_2$), chondrodite, and humite. The chemical reactions are characterized by the evolution of SiF_4 from the quartz + CaF_2 mixture, which changed MgO to minerals of the humite group and caused the crystallization of cuspidine above 1200° to 1350°C. The reaction products on the crucible walls show a distinct zoning, and the mineralogical composition of the zones is given in percentages from microscopic measurements. The optical properties of the complex F silicates observed are the normal ones known from rocks. Among the orthosilicates, forsterite is rarely observed, but monticellite rather frequently. Sellaite (MgF_2) is entirely absent. Wollastonite and pseudowollastonite are abundant in the Ca silicate parts of the samples. From a practical standpoint it is evident that porcelain crucibles are unsuitable for batches or slags containing CaF_2.

3

GUL'KO, N.V.

USSR/ Minerals - Composition

Card 1/1 : Pub. 22 - 36/44

Authors : Dolkart, F. Z., and Gul'ko, N. V.

Title : Changes in mineralogical composition of titano-alumina slag during heating

Periodical : Dok. AN SSSR 98/1, 137-139, Sep 1, 1954

Abstract : The changes in the mineralogical composition of titano-alumina slag, taking place during the heating of the latter in a weakly oxidizing medium, were investigated. Noticeable change in the mineralogical composition of the tested slag was observed at 800°. A sudden change was also noticed after calcination at 1400° as result of formation of aluminum titanate. Five USSR references (1949-1952). Table; graph; illustrations.

Institution : All-Union Scientific Research Institute of Refractories

Presented by : Academician I. P. Bardin, April 9, 1954

Goul'ko, N. V.

2

1245. The system Al_2O_3–TiO_2–ZrO_2.—A. S. Berezhnoi and N. V. Gul'ko [illegible] *Akad. Nauk Ukr. R.S.R.*, No. 1, 77, 1955; from *Chem.* [illegible] Russian. This ternary system is tentatively constructed from the avail[illegible] 3 binary systems and the experimental data obtained, [illegible] Al_2TiO_5–ZrO_2. In the latter system a eutectic at 1,620° with [illegible] the 2 components do not form solid solutions. In the [illegible] triple point were located (the latter tentatively) at 1,610°, 1,580°, and [illegible] Al_2O_3, TiO_2, and ZrO_2 (wt. %): 42, 14, 44; 18, 60, 22; 22, 35, 43. [illegible] of the 3 components, Al_2TiO_5, and $ZrTiO_4$ were outlined. Solid [illegible] form on the TiO_2–ZrO_2 side. None of the liquidus is below 1,580°, wh[illegible] the ternary, as a refractory, superior to the Al_2O_3–TiO_2–BeO system.

Chem

PM [illegible]

GUL'KO, N. V.

USSR/ Chemistry - Refractories

Card 1/1 Pub. 116 - 4/24

Authors : Berezhnoy, A. S., and Gul'ko, N. V.

Title : Investigation of the $MgO-Al_2O_3-TiO_2$ system

Periodical : Ukr. khim. zhur. 21/2, 158-166, 1955

Abstract : Data are presented regarding the crystal form, structure, melting point and anisotropy of $MgO-Al_2O_3-TiO_2$ systems which are considered highly important for the technology of refractories and electro-ceramics. The solid solutions which form in this ternary system are described. Eleven references: 7 USA, 1 German and 3 USSR (1916-1953). Graphs; drawings.

Institution : All Union Inst. of Refractories, Kharkov

Submitted : July 18, 1954

SOV/137-58-10-20706

Translation from: Referativnyy zhurnal, Metallurgiya, 1958, Nr 10, p 53 (USSR)

AUTHORS: Pirogov, A.A., Rakina, V.P., Gul'ko, N.V.

TITLE: Service Life and Wear of Rammed Lining of Induction Furnaces for the Refining of Aluminum and Its Alloys (Sluzhba i iznos nabivnoy futerovki induktsionnykh pechey dlya rafinirovaniya alyuminiya i yego splavov)

PERIODICAL: Byul. nauchno-tekhn. inform. Vses. n.-i. in-t ogneuporov, 1956, Nr 1, pp 86-93

ABSTRACT: Materials made in this country are used to develop a rammed bulk refractory for the hearth stones of vacuum induction furnaces for the refining of Al and alloys thereof. The paste consists of Chasov Yar fireclay of <2 mm (50%) and 20% clay, 20% of Ovruch quartzite (<0.5 mm), and 10% barite. The chemical composition, in %, is: SiO_2 59, $Al_2O_3 + TiO_2$ 22.43, Fe_2O_3 1.17, CaO 1.07, MgO 1.24, BaO 6.58, SO_3 3.6, R_2O 1.98, and 2.68% impurities. After ramming by pneumatic tamper, the mass is dried in the air for 10 days and then for 14 days by roasting in a producer-gas furnace at 550°C.

Card 1/2

Service Life and Wear of Rammed Lining of Induction Furnaces (cont.)

During the first 5 days, the oven was used to melt Al alloys with 3.5-4% Mg at 850-1010° and then alloys with $\leq$ 0.5% Mg at 820-880°. The furnace ran for 15 months and 10 days, after which the hearth stone was replaced. Investigation of the lining showed that in the process of operation it became impregnated with Al and became α-Al_2O_3-enriched, with simultaneous reduction in SiO_2 contents to 2-4%, the Si going into the alloy. The elevated Mg contents of the Al alloy results in the formation of $MgO \cdot Al_2O_3$ in the surface layer of the lining.

Ye.Z.

1. Induction furnaces--Equipment 2. Refractory materials--Development 3. Refractory materials--Life expectancy

Card 2/2

15.2200 30620

SOV/81-59-5-16175

Translation from: Referativnyy zhurnal, Khimiya, 1959, Nr 5, p 352 (USSR)

AUTHORS: Tsynkina, V.M., Gul'ko, N.V.

TITLE: Refractories From Strontium and Barium Compounds

PERIODICAL: Sb. nauchn. tr. Vses. n.-i. in-ta ogneuporov, 1958, Nr 2 (49), pp 297 - 318

ABSTRACT: The possibility was investigated of obtaining highly refractory articles based on Sr and Ba compounds. It was established that SrO can be used in the production of refractories (R) (burning at 1,750°C, grain size $< 60\mu$, porosity after burning 26 - 27%). The products are hydrated in air. It is recommended that admixtures of BeO and Al_2O_3 be added to the products of SrO to avoid this. R cannot be obtained from BaO by the usual method, since BaO is hydrated intensively in air, and Ba hydroxide, in admixture with BaO, melts at a temperature of $<$ 1,000°C when heated, which leads to fusion of the products. Zirconates of Sr and Ba are synthesized in the solid phase at a temperature of 1,000°C (tables of the properties of products made of Sr and

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Refractories From Strontium and Barium Compounds

Ba zirconates are submitted). R made of Sr and Ba zirconates are highly refractory and are not hydrated during burning at 1,750°C. The orthosilicates of Sr and Ba were synthesized, the refractoriness was 1,750 and 1,910°C, respectively. R made of these have a high density and are not subject to hydration in air. The aluminates of Sr and Ba were synthesized; their properties were studied and R articles were produced from them. It is established that tristrontium and tribarium aluminates belong to the group of non-refractory compounds. Monoaluminates and hexaaluminates of Sr and Ba are not subject to hydration in air. The monoaluminate of Sr (porosity 1%) has a refractoriness of 1,800°C. R from zirconates, silicates and aluminates of Sr and Ba can be produced by briquetting with double burning of the briquet and intermediate crushing (size of the grain $< 60\mu$).

I. Mikhaylova

Card 2/2

AUTHORS: Margulis, O. M., Gul'ko, N. V. SOV/20-121-3-35/47

TITLE: On the Destabilization of the Cubic Form of Zirconium Dioxide (K voprosu o destabilizatsii kubicheskoy formy dvuokisi tsirkoniya)

PERIODICAL: Doklady Akademii nauk SSSR, Vol. 121, Nr 3, pp. 523 - 526 (USSR) -1958

ABSTRACT: Zirconium dioxide has a very high melting temperature (2700°). It is, however, not possible to produce refractory material from it since it is decomposed in the course of baking. The constants of natural zirconium dioxide - of baddeleyite - are mentioned (Refs 1,2). In heating ZrO_2 undergoes polymorphic transformations from a monoclinic into a tetragonal modification (at about 1000°, Refs 3,4; to be quite exact, at 950 - 1150°, Ref 5). This transformation is reversible and is accompanied by large volume changes; this is also the cause of decomposition in the case of baking. At certain conditions of thermal treatment the trigonal modification can also be produced (according to Ref 6). The conditions of existence at this form have hitherto not been completely determined. In order to produce refractory

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material from ZrO_2 it ought to be stabilized in cubic modification by various additions, which crystallize also in a cubic system. Furthermore, these additions ought to have a higher percentage of heteropolar bindings than ZrO_2 itself (Refs 5). According to the latest papers this is true of CaO and MgO(Refs 5,7). Contrary to the leading opinions it was found that ZrO_2 stabilized in the mentioned way is destabilized by heating for a long duration between 1100 and 1400° (Refs 5, 8,9). For the stabilization of ZrO_2 the authors used 10 to 30 mol % CaO and 14 to 35 mol % MgO. The mixture was melted in the arc furnace and ceramically sintered in a forge with crude oil heating for 6 hours at a temperature of 175°. It could be petrographically and roentgenologically proved that ZrO_2 + CaO and MgO were represented in cubic form after both melting and sintering. After having been moisted with water a $< 2\mu$ fine powder was pressed under a pressure of 600 kg/cm^2 into cubes and cylinders and baked at 1750° for 6 hours. In all cases the composition of the phases was microscopically determined to be cubic. The formula with 10 mol % CaO and 14 mol %

On the Destabilization of the Cubic Form of Zirconium Dioxide SOV/20-121-3-35/47

MgO where the monocline ZrO_2 modification was found (< 1%) was an exception. Thus the destabilization of the cubic form proceeds very slowly. The results are shown on tables 1 and 2. They reveal that the degree of decomposition of solid solutions $CaO - ZrO_2$ and $MgO - ZrO_2$ depends upon the composition of the additions and on the concentration of the solid solution. The thermal treatment (melting or sintering) has hardly any effect on the destabilization. The investigations carried out show how complicated the mechanism of decomposition of the mentioned solid solutions is and point to the need for further investigations. There are 2 tables and 12 references, 8 of which are Soviet.

ASSOCIATION: Vsesoyuznyy nauchno-issledovatel'skiy institut ogneuporov, g. Khar'kov (Khar'kov, All-Union Scientific Research Institute of Refractory Materials)

PRESENTED: March 22, 1958, by N.V.Belov, Member, Academy of Sciences, USSR

Card 3/4

15 2400

29425
S/081/61/000/017/077/166
B101/B102

AUTHORS: Berezhnoy, A. S., Repenko, K. N., Getman, I. A., Gul'ko, N. V.

TITLE: Experimental studies of molybdenum disilicide as a refractory material

PERIODICAL: Referativnyy zhurnal. Khimiya, no. 17, 1961, 334, abstract 17 K200 (Sb. nauchn. tr. Ukr. n.-i. in-t ogneuporov, no. 4, 1960, 296-317)

TEXT: The conditions under which $MoSi_2$ is synthesized from mixture of Mo and Si powders in a stoichiometric ratio without pressure at 1200-1600°C in an H_2 atmosphere have been studied. It has been found that laboratory samples of $MoSi_2$ can be obtained (without preliminary synthesis) by hot pressing at 40 kg/cm^2 in graphite molds. High-density samples of $MoSi_2$ with a porosity of 7% were obtained by hot pressing at 200 kg/cm^2 and 1700°C. For $MoSi_2$ samples fired in a vacuum furnace, the coefficient of thermal expansion in vacuo between 20 and 1580°C was found to be $12.2 \cdot 10^{-6}$. High-density samples showed maximum stability against atmospheric O_2 on

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Experimental studies of molybdenum ...

heating. At 20°C, σ_{compr} = 4500-10,000 kg/cm^2, depending on the grain composition of the charge and on the firing temperature; at 1650°C, σ_{compr} = 350-525 kg/cm^2. Under loads of 2 and 10 kg/cm^2 no deformation was observed at 1650°C. $MoSi_2$ can be used as a refractory material.

[Abstracter's note: Complete translation.]

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15.2210

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AUTHORS: Frenkel', A.S., Shmukler, K.M., Sukharevskiy, B.Ya., Gul'ko, N.V. S/020/60/130/05/039/061 B011/B005

TITLE: On the Mechanism of Formation and Decomposition of Solid Solutions of Spinels in Periclase

PERIODICAL: Doklady Akademii nauk SSSR, 1960, Vol 130, Nr 5, pp 1095-1098 (USSR)

ABSTRACT: The purpose of this paper is an investigation of the mechanism mentioned in the title which has not yet been clarified sufficiently. The authors studied the interaction of periclase with spinels the cations of which are Mg^{2+}, Fe^{2+}, Al^{3+}, Cr^{3+}, and Fe^{3+}. X-ray-, chemical-, and petrographical investigations were carried out. The samples were quenched to fix the high-temperature state. The authors ascertained that there is a certain limiting concentration (Fig 1) for solid spinel solutions in periclase for every temperature. The roentgenograms of the solid solutions show the same system of lines as the roentgenograms of magnesium oxide. The lattice parameter of the solid solutions decreases with increasing concentration of the solutions (Fig 2). The solid spinel solutions in periclase

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On the Mechanism of Formation and Decomposition of Solid Solutions of Spinels in Periclase

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B011/B005

are formed as a consequence of the substitution of magnesium ions by bivalent and trivalent spinel cations. This is confirmed by the authors by comparing the calculated (formula (1)) and experimentally found values of the lattice parameters of these solutions. Table 1 shows that these values lie very close to each other. The placing of the smaller trivalent ions instead of the magnesium ions in the hollow spaces of the octahedron causes a compression of the lattice and, thus, an increase in free lattice energy. The authors also derive rules of solubility in periclase for spinels of complex composition, or spinel mixtures. Solid spinel solutions in periclase are only stable at high temperatures. The solid solution decomposes on cooling. The concentration of the remaining solid solution corresponds to the saturated solution at this lower temperature (Fig 3). Decomposition of the solid solution begins on quenching in water, and is much intensified by quenching in oil. On the basis of the roentgenograms, the authors assume a subsequent decomposition mechanism of solid spinel solutions in periclase: at high R^{3+} concentrations, the supersaturation and the increase in free energy cause such a shift of ions within the elementary

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cell by fractions of the period that some part of the ions adopt tetrahedral positions. It may be assumed that in very small regions such fluctuations are probable. Consequently, the formation of nuclei of the spinel phase is ensured by the number of occupied tetrahedral positions in these regions. This assumption was confirmed electron-microscopically as well as by the roentgenogram of the isolated miniature inclusions having a spinel structure. S.T. Balyuk took part in the work. There are 3 figures, 1 table, and 5 references, 2 of which are Soviet.

ASSOCIATION: Ukrainskiy nauchno-issledovatel'skiy institut ogneuporov (Ukrainian Scientific Research Institute of Refractories)

PRESENTED: July 25, 1959, by N.V. Belov, Academician

SUBMITTED: July 21, 1959

34756
S/020/62/142/003/024/027
B101/B110

15.2520

AUTHORS: Kordyuk, R. A., and Gul'ko, N. V.

TITLE: Subsolidus structure and ternary compounds in the system $CaO - ZrO_2 - SiO_2$

PERIODICAL: Akademiya nauk SSSR. Doklady, v. 142, no. 3, 1962, 639-641

TEXT: The reactions in solid phase of the combinations (1) Ca_2SiO_4 + $CaZrO_3$; (2) Ca_2SiO_4 + ZrO_2; (3) Ca_2SiO_4 + $ZrSiO_4$; (4) $Ca_3Si_2O_7$ + ZrO_2; (5) $CaSiO_3$ + $CaZrO_3$; (6) $CaSiO_3$ + ZrO_2; and (7) $CaSiO_3$ + $ZrSiO_4$ were subjected to microscopic and X-ray investigations. Mixtures (ratio by weight 1:1) of the substances mentioned (synthesized from pure ZrO_2, quartz, and $CaCO_3$) were calcined by raising the temperature from 1200°C to the melting point at 50 - 100°C intervals. Reactions were found to take place in mixtures (4) and (7), but not in mixtures (1), (2), and (6). Formation of two compounds was observed when studying the systems

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Subsolidus structure and ternary...

Ca_2SiO_4 - $CaSiO_3$ - ZrO_2 and $CaSiO_3$ - SiO_2 - ZrO_2. $Ca_3ZrSi_2O_9$ (I) forms from $CaSiO_4$ + $CaSiO_3$ + ZrO_2 or $Ca_3Si_2O_7$ + ZrO_2. The beginning of formation is microscopically observed at 1200°C. At 1400°C, the yield is 90% after 2 hr. The compound is most perfectly formed at 1500°C from $Ca_3Si_2O_7$ + ZrO_2. At 1600°C, incongruent melting takes place with formation of Ca_2SiO_4, ZrO_2, and melt. Optical constants of I are: N_g = 1.758; N_m = 1.737; N_p = 1.735; $N_g - N_p$ = 0.023, 2V = 2°92'. The sign of the principal zone is positive, biaxial, with linear extinction. Crystallization in a rhombic system is assumed for I. The specific gravity determined pycnometrically is 3.46 g/cm³. The formation from oxides occurs with increase in volume (ΔV = +2.6%). The linear expansion coefficient α is $11.9 \cdot 10^{-6}$. The compound is soluble in concentrated HCl, and hydrolyzes in boiling water. $Ca_2ZrSi_4O_{12}$ (II) forms (after ~15 hr) at 1400°C; the sample has to be crushed several times during this process. Above 1430°C, incongruent melting takes place with formation of $ZrSiO_4$

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and melt. Data for II are: N_g = 1.658; N_p = 1.653; $N_g - N_p$ = 0.005; specific gravity = 3.06 g/cm^3, ΔV = +7.3%; $\alpha = 5.9 \cdot 10^{-6}$. The sign of the principal zone is positive, biaxial, extinction is linear. A rhombic system is therefore assumed. Compound II is unsoluble in concentrated HCl, and does not hydrolyze. X-ray data (line intensities and interplanar spacings) found for I and II by A. M. Gavrish are tabulated. No reactions were observed between I and ZrO_2, $CaSiO_3$, $Ca_3Si_2O_7$, Ca_2SiO_4, and between II and ZrO_2, $ZrSiO_4$, SiO_2, and $CaSiO_3$. The subsolidus structure of the system CaO - ZrO_2 - SiO_2 (Fig. 1) differs from that of the system SrO - ZrO_2 - SiO_2. G. V. Voronkov and Ye. I. Medvedovskaya are mentioned. There are 1 figure, 1 table, and 3 references: 1 Soviet and 2 non-Soviet. The reference to the English-language publication reads as follows: P. S. Dear, Bull. of the Virginia Polytechn. Inst., 51, [8], 10 (1958); Chem. Abstr., 53, [5], 3862 (1959).

ASSOCIATION: Ukrainskiy nauchno-issledovatel'skiy institut ogneuporov (Ukrainian Scientific Research Institute of Refractory Materials)

KORDYUK, R.A.; GUL'KO, N.V.

Subsolidus structure and ternary compounds of the system CaO - ZrO_2 - SiO_2. Dokl. AN SSSR 142 no.3:639-641 Ja '62. (MIRA 15:1)

1. Ukrainskiy nauchno-issledovatel'skiy institut ogneuporov. Predstavleno akademikom N.V.Belovym.
(Systems (Chemistry)) (Metallic oxides)

S/131/63/000/001/004/004
B117/B101

AUTHORS: Repenko, K. N., Gul'ko, N. V., Getman, I. A.

TITLE: Reaction of metallic titanium with crucibles made of zirconium dioxide

PERIODICAL: Ogneupory, no. 1, 1963, 42 - 45

TEXT: The microstructure and phase composition of crucibles made of ZrO_2 with addition of CaO or Ti, used for producing pure titanium, were investigated before and after use. Experimental crucibles were made by casting aqueous slips of ZrO_2 (grain size $< 3\mu$). The ZrO_2 stabilized with CaO at 1750°C gave, after firing at 1750°C, a material consisting entirely of cubic ZrO_2 with a porosity of 0.1%. The ZrO_2 with an addition of 6.4% titanium by weight, initially annealed at 1450°C, was fired at 1850°C. In material containing 95% of the monoclinic ZrO_2 modification the porosity was 1.5%. Titanium was melted in these crucibles at 10^{-4} mm Hg, holding the temperature at 1670 - 1680°C for 30 or 10 min. In crucibles with Ti addition no contact between melt and crucible wall existed after 30 min.

Reaction of metallic...

The content of metallic titanium in the crucible material had increased. Titanium was evenly distributed among the ZrO_2 grains throughout the thickness of the wall. The microhardness of these grains was lower as compared with pure ZrO_2, but the microhardness of the metal had increased as compared with pure titanium. In crucibles with CaO addition, close contact between refractory material and metal melt existed after 30 min. The melt had only slightly penetrated into the refractory material, but caused its erosion. A layer of about 90μ thickness was formed, consisting of metal with sparsely distributed small ZrO_2 particles, some of which penetrated to a depth of 350μ into the melt. After 10 min melting time, similar but less intensive reactions took place in both cases. Conclusion: ZrO_2 crucibles with Ti addition are more durable and offer greater resistance to heat than those with CaO addition. This can partly be ascribed to the fact that titanium forms a solid cover around the ZrO_2 particles and protects ZrO_2 from destruction. Further laboratory and factory tests of ZrO_2 crucibles with titanium addition are recommended as well as investigation of the metal so produced. There are 2 figures and 1 table.

ASSOCIATION: Ukrainskiy nauchno-issledovatel'skiy institut ogneuporov (Ukrainian Scientific Research Institute of Refractory Materials)

Card 3/3

BEREZHNOY, A.S.; GUL'KO, N.V.

Sub-solidus structure of the system CaO - MgO - Al_2O_3 - TiO_2 - SiO_2. Sbor.nauch.trud. UNIIO no.5:65-78 '61. (MIRA 15:12)
(Refractory materials) (Phase rule and equilibrium)

GUL'KO, N.V.

Causes of the crumbling of tetania-alumina slags. Sbor.nauch. trud. UNIIO no.5:299-302 '61. (MIRA 15:12)
(Refractory materials) (Slag)

REPENKO, K.N.; GUL'KO, N.V.; GETMAN, I.A.

Interaction of metal titanium with crucibles made of zirconium dioxide. Ogneupory 28 no.1:42-45 '63. (MIRA 16:1)

1. Ukrainskiy nauchno-issledovatel'skiy institut ogneuporov.
(Titanium--Metallurgy) (Crucibles)

BEREZHNOY, A.S.; GUL'KO, N.V. [Hul'ko, N.V.]; GAVRISH, A.M. [Havrysh, A.M.]

Solid solutions in the system $MgCr_2O_4$-M_2TiO_4, $CaTiO_3$-$CaZrO_3$ and $Cr_2Ti_2O_7$-$CaZrTi_2O_7$. Dop. AN URSR no. 12:1614-1617 '64.

1. Ukrainskiy institut ogneuporov. 2. Chlen-korrespondent AN UkrSSR (for Berezhnoy).

KORDYUK, R.A.; GUL'KO, N.V.

Tetrahedration of the system $MgO - Al_2O_3 - ZrO_2 - SiO_2$. Dokl. AN SSSR 154 no.5:1183-1184 F'64. (MIRA 17:2)

1. Ukrainskiy nauchno-issledovatel'skiy institut ogneuporov. Predstavleno akademikom N.V. Belovym.

L 2595-66 EWT(d)/EWT(l)/EWP(e)/EPA(s)-2/EWT(m)/EPF(c)/EWP(i)/EPA(w)-2/EPF(n)-2/
ACCESSION NR: AP5019197 EWP(v)/T/EWP(t)/EWP(k)/ UR/0115/65/000/006/0019/0023
EWP(h)/EWP(b)/EWP(l)/ETC(m) IJP(c) JD/WW/JG/ 536.532
AT/WH

AUTHOR: Kamenetskiy, A. B.; Gul'ko, N. V.

TITLE: Interaction between the electrodes in tungsten-rhenium thermocouples with pure-oxide insulation

SOURCE: Izmeritel'naya tekhnika, no. 6, 1965, 19-23

TOPIC TAGS: thermocouple, tungsten rhenium thernocouple

ABSTRACT: The results are reported of an experimental investigation of reactions between W, Mo and these oxides: Al_2O_3, MgO, ZrO_2, $MgAl_2O_4$, $CaZrO_3$, and $SrZrO_3$. Thin powders of 30% metal and 70% oxide compacted into tablets were heated to 1750--2350C and subsequently analyzed by microscopic, x-ray, and chemical methods. Also reactions between the same oxides and VP-5 and VP-10 tungsten-rhenium alloys at 1740--2300C were investigated. It is found that best available insulation for Mo, W, and W-Re electrodes is: (1) Al_2O_3 and $MgAl_2O_4$ for the ceramic-graphite-enclosed thermocouples operating in oxidizing media at temperatures up to 1950C; (2) Beads made from MgO or the above zirconates in reducing CO/CO_2 atmospheres and temperatures up to 2300C; (3) For operating in vacuum (0.013 n/m²), up to 1950C,

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ACCESSION NR: AP5019197

Al_2O_3 and $MgAl_2O_4$; up to 1850C, MgO; up to 2300C, the above zirconates. Orig. art. has: 1 figure and 3 tables.

ASSOCIATION: none

SUBMITTED: 00 ENCL: 00 SUB CODE: IE, GC

NO REF SOV: 003 OTHER: 001

Card 2/2

L 20[illegible]-66 EWP(e)/EWT(m)/EWP(i)/ETC/EPF(n)-2/EWG(m)/T/EWP(t)/EWP(b)/EWA(c)
[illegible] JD/WW/JG/AT/WH
ACCESSION NR: AP5023965 UR/0073/65/031/009/0881/0887
62-503.4

57
55
B

AUTHOR: Berezhnoy, A. S.; Gul'ko, N. V.

TITLE: Subsolidus structure of a hexacomponent system $MgO-Cr_2O_3-Al_2O_3-ZrO_2-TiO_2-SiO_2$

SOURCE: Ukrainskiy khimicheskiy zhurnal, v. 31, no. 9, 1965, 881-887

TOPIC TAGS: solid solution, refractory oxide, phase diagram, phase equilibrium, ceramic product

ABSTRACT: The subsolidus structure of $MgO-Cr_2O_3-Al_2O_3-ZrO_2-TiO_2-SiO_2$ was studied in detail. The complexity of this system is reflected in occurrance of 99 conodes between the neighboring phases. The distribution of conodes according to number of crystal spacings n corresponding to a concentrated hexaton of the $MgO-Cr_2O_3-Al_2O_3-ZrO_2-TiO_2-SiO_2$ system is shown in fig. 1 of the Enclosure. The dependence of the logarithm of the average number of elemental politons in subsystems of this hexacomponent system upon the number of these polytons n is shown in fig. 2 of the Enclosure. It was found that in the $MgO-Cr_2O_3-Al_2O_3-ZrO_2-TiO_2-SiO_2$ system there cannot be stable phases composed of more than 3 pure components. The depen-

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ACCESSION NR: AP5023965

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dence of the maximum (1) and minimum (2) melting temperatures of crystalline phases and of the melting temperature of the lowest melting eutectic (3) among the subsystems of the hexacomponent system MgO -Cr_2O_3-Al_2O_3-ZrO_2-TiO_2-SiO_2 upon the number of subsystems or phases, n, is shown in fig. 3 of the Enclosure. Orig. art. has: 4 tables, 7 figures.

ASSOCIATION: Ukrainskiy institut ogneuporov (Ukrainian Institute of Refractory Materials)

15

SUBMITTED: 09Feb65 ENCL: 03 SUB CODE: MT, SS

NO REF SOV: 006 OTHER: 000

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L 2013-66
ACCESSION NR: AP5023965

ENCLOSURE: 01

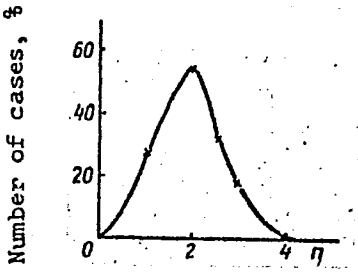

Fig. 1

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L 2013-66

ACCESSION NR: AP5023965

ENCLOSURE: 02

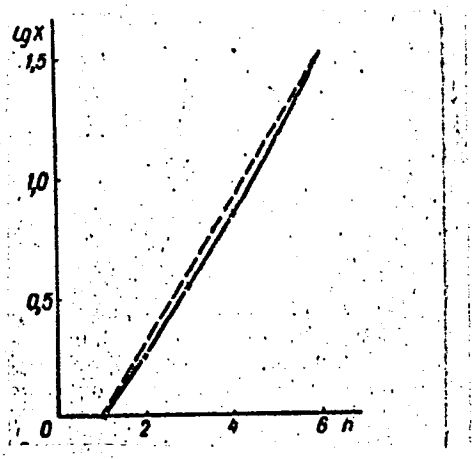

Fig. 2

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L 2013-66
ACCESSION NR: AP5023965

ENCLOSURE: 03

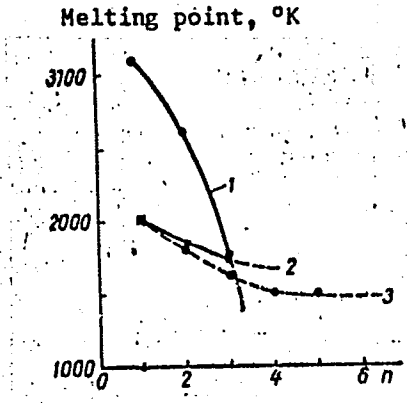

Fig. 3

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BEREZHNOY, A.S.; GUL'KO, N.V.

Subsolidus structure of the four-component systems $MgO - Cr_2O_3 - Al_2O_3 - SiO_2$, $MgO - Cr_2O_3 - Al_2O_3 - TiO_2$, and $MgO - Cr_2O_3 - Al_2O_3 - ZrO_2$. Dokl. AN SSSR 164 no.2: 384-386 S '65. (MIRA 18:9)

1. Ukrainskiy institut ogneuporov, Khar'kov. Submitted February 27, 1965.

BEREZHNOY, A.S.; GUL'KO, N.V.

Subsolidus structure of the six-component system $MgO - Cr_2O_3 - Al_2O_3 - ZrO_2 - TiO_2 - SiO_2$. Ukr. khim. zhur. 31 no.9:881-887 '65. (MIRA 18:11)

1. Ukrainskiy institut ogenuporov.

[illegible]

Subsolidus structure of the system [illegible] and its four-component subsystems. [illegible] AN [illegible] [illegible]
165. [illegible]

1. [illegible] issledovatel'[illegible]
2. [illegible] AN [illegible]SSR [illegible]
[illegible]

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